Digitized by the Internet Archive
in 2018 with funding from
University of Toronto

https://archive.org/details/medjournalMar1945uoft

Volume XXII Toronto, March, 1945 Number 5

The University of Toronto Medical Journal

(AN UNDERGRADUATE PUBLICATION)

This journal is published six times a year, November to April, by the Medical Society of the University of Toronto, to serve as a medium for student expression and to bring to the student recent articles of scientific interest.

$1.50 per volume. 25c. per single copy.

ADVISORY STAFF

PROF. A. E. LINELL, M.D., Ch.B.(Manc)
J. H. COUCH, M.A., M.B., F.R.C.S.(Edin.), F.R.C.S.(C.)
J. HEPBURN, M.B., F.R.C.P.(C.)
D. Y. SOLANDT, M.A., M.D., Ph.D.(Lond.)
A. M. WYNNE, M.A. Qu., Ph.D.
H. H. HYLAND, M.D., M.R.C.P.(Lond.), F.R.C.P.(C.)

Editor-in-Chief
PETER ALLEN

Associate Editor
J. C. CALLAGHAN

Assistant Editor
R. R. V. RICHTER

Managing Editor
W. J. McGANITY

Women's Editor
DORCAS BEATON

Circulating Manager
J. B. J. McKENDRY

Abstracts Editor
M. P. G. ST. AUBIN

Features Editor
C. A. F. MOES

Assistants

1st Year—EDWARD FISH
2nd Year—E. A. McCULLOUGH
4th Year—R. R. V. RICHTER
6th Year—J. A. LITTLE

Address all communications to Room 107, Anatomy Building

EDITORIAL

Due to the acute pressure of examinations a complete editorial is impossible, however this is the opportunity therefore, to speak briefly upon the subject of the Medical Journal.

Every year since the founding of the University Medical Journal, the annual staff has had a policy which it has attempted to follow, obtaining various success. This year we have attempted to change things in a manner which was deemed necessary to improve the quality and quantity of material used in the Journal. While attempting to do this rearrangement the reader has been kept clearly in mind, that is to say the pre-clinical student, the clinical student and the graduates of medicine both new and old.

A balanced mixture of academic and practical medical literature has been injected into recent issues and when deemed expedient some articles of past issues have been reprinted for their exceptional interest and use to the undergraduate medical student. Further, to increase the interest of the Medical Journal a series of articles on physiological topics which have been presented at the Banting Institute, will be published beginning with this issue of the Journal.

As you are perhaps aware it is not possible to please every type of reader nor to please every desire in medical reading interest, therefore any comment on the Journal as to its policy or articles would be sincerely appreciated!

GASTRO-INTESTINAL MOTILITY

A. S. DEACON
Fellow in the Department of Physiology, University of Toronto.

I will first relate a little of the history of our knowledge of the functioning of the gastro-intestinal tract. The earliest writings on this system naturally referred to its pathological conditions. A collection of writings compiled about 1550 B.C., known as the *Papyrus Ebers*, spoke of such conditions as weak digestion, constipation with meteorism and rumbling, hemorrhage of the stomach, dilatatia ventricula or dilated stomach and even appendicitis. The ancient Greeks, while developing many aspects of medicine, added very little to gastro-intestinal disease. Hippocrates mentioned wounds of the stomach and noted that warm foods and cold drinks were most agreeable. He observed patients with an undoubted intestinal obstruction and stated that whatever they drank or ate they vomited—finally vomiting fecal material. Galen described tumors and ulcers of the oesophagus and stomach. But his theories of the processes of digestion, just as of circulation, were erroneous, and these fundamental misconceptions undermine all his discussions of the gastro-intestinal tract. Following Galen's death, medicine lapsed into a long period of lethargy for about fourteen centuries. During this period, all problems were referred back to Galen as a final authority, in true Aristotelian style, from whom there could be no appeal. So it was finally Vesalius in the 15th century who taught that anatomy and physiology should be learned from human bodies and not from the book of Galen. Following Vesalius, much work was reported on various pathological conditions of the stomach and intestines by Giovanni Morgagni, John Brown, 1685, Jean Cruveilhier 1836. The actual study of the processes of digestion was laid out in the teachings of a genius with the very distinguished name of Philippus Aureolus Theophrastus Bombastus von Hohenheim, perhaps better known as Paracelsus. Réaumur, a French scientist, carried out some most interesting studies of digestion. He owned a pet kite—a bird of prey—which ejects from its stomach articles of unpalatable food. So he fed this kite metal tubes containing meat, starch, bone, etc., with a grating on, preventing escape of the contents. Thus, on ejection, he was able to examine the partially digested food. Then he fed it tubes containing pieces of sponge and found on regurgitation that he could squeeze gastric juice from the sponge for examination.

It was William Beaumont in 1825 who first began the study of digestion and movement of the stomach *in situ*. While he was a surgeon in the U.S. army in the forests of northern Michigan, he attended a French Canadian voyageur, Alexis St. Martin, whose stomach had been perforated by the discharge of a musket. The wound healed but a fistula remained leading on to the skin. And thus Beaumont was able to carry out studies on the relative digestibilities of foodstuffs, on gastric secretion, and so forth.

The gastric tube has a very interesting and old history, dating back to the "pinna" or vomiting feather which the Romans used at their feasts following each course, to make room for the one to follow. Thomas Willis in 1679 described a case of cardiospasm which he treated by feeding a meal and then passing a whale bone down the oesophagus to the end of which

he had attached a sponge. Apparently this treatment worked very well. Fabricius Hildanus, the father of German surgery in the late 1500's, developed a gastric sound for the extraction of small bones and foreign bodies from the oesophagus. The stomach brush was introduced in England in the late 1600's due to some popular fad that the cleansing of the stomach was an excellent aid for all stomach complaints. And, strangely enough, the victim seldom required or requested a second treatment.

John C. Hammeter in 1896 was the first to attempt visualization of the stomach under X-rays. He introduced a bag containing lead acetate solution. In 1904, Rieder advocated the use of a mixture of gruel and bismuth, which later became known as Rieder's meal.

In 1869, Kussmaul first attempted gastroscopy—the direct visual observation of the interior of the stomach. He wisely chose a sword swallower for his subject, but the experiment was not successful, due to imperfections in the instrument. Mikulicz made some improvements of the gastroscope and is commonly spoken of as the founder of gastroscopy.

Before discussion of the physiology of the gastro-intestinal tract it would be well to run over very briefly the anatomy of the region. The parts are: oesophagus, stomach, duodenum, small and large intestine. The various elements of the gut wall as seen on longitudinal section are the muscularis mucosa, circular and longitudinal muscle coats, the submucous plexus of Meissner and the myenteric plexus of Auerbach, and their central communications. Since our discussion of the movements of the tract involve knowledge of the type of muscle involved, I will give a very brief summary of the chief features of smooth muscle—wherein it differs from skeletal muscle.

1. Sluggishness of contraction.
2. Greater extensibility.
3. Exhibition of sustained contraction or tonus even when isolated from the central nervous system.
4. The power of rhythmical contraction.
5. The possession of a double autonomic innervation.
6. Greater sensitivity to thermal and chemical influences.
7. Longer chronaxie.

The Oesophagus

This is a muscular tube whose upper third consists of striated muscle, middle third of mixed, and lower third of smooth muscle. This striated muscle is peculiar in that it does not atrophy when its nerve supply is cut, but maintains its tone. Another peculiarity is that, though striated, one has no control over it. There are three types of activity in the oesophagus:

First, the squirting action of swallowing.

Second, the chain of reflexes set up by swallowing, including (*a*) the receptive relaxation at the lower end for food and fluids, (*b*) the relaxation of entire oesophagus for fluids, (*c*) the propagation of peristaltic waves.

Third, a travelling peristaltic wave which may start anywhere in the organ.

In addition to these, Alvarez has noted reverse wavelets starting at the cardia, passing to the pharynx. Kast found that lycopodium spores swallowed in a capsule could be obtained from mouth washings the next morning in fifty per cent of subjects. After a meal there is a tendency for gas to be expelled from the stomach to the mouth, commonly called belching. Alvarez claims it is due to these reverse wavelets commencing in the cardiac end of the stomach. In certain abnormal cases, however, there is great and repeated belching — a condition known as aerophagy, the swallowing of air. The greater

part of this air collects in the lower part of the oesophagus until there is a good volume, so that on belching a certain satisfaction is felt. But the actual intragastric pressure is not changed.

The innervation of the upper or striated portion of the oesophagus is by extrinsic nerves; the lower portion or smooth muscle by intrinsic nerves. Naturally, movement is most rapid in the striated, and slowest in the smooth section.

The Cardiac Sphincter

Although no distinct sphincter is seen anatomically, yet, due to functional observations, one is forced to acknowledge its presence. The action of the sphincter has been studied by Barclay, who noted that the food passed through the cardia in one of three ways:

First, and most commonly, especially with fluids, is a simple relaxation of the sphincter, the forming of a patulus or open canal.

Second, occasionally, and especially if slight obstruction present, a peristaltic wave propelled the food through.

Third, in one healthy medical student the end of the oesophagus actually invaginated itself into the stomach as the contents were forwarded.

The sphincter along with the adjacent portion of the stomach relax during the act of swallowing. This is termed a receptive relaxation reflex. Hurst and his associates have brought out a theory of the cause of cardiospasm or functional dysphagia. They state that there has been a degeneration of the parasympathetic myenteric plexus and so the sympathetic, acting unopposed, keeps the cardia closed so that the normal swallowing act does not produce a receptive relaxation.

Adamson had very good clinical results following sympathectomy in human beings with cardiospasm.

Stomach

The motility of the stomach was originally taught by Beaumont, Hofmeister and Schutz in the early 1800's as a peristaltic contraction which travelled from the fundus to the pars pylorica where a transverse band closed down, forcibly dividing the stomach into two pouches. Then there was a contraction of the whole pyloric antrum, forcing the food into the duodenum. But since that time, due to its clinical importance, due to the improved techniques for studying gastric motility, much exhaustive work has been done along this line, especially by Alvarez, Cole, Cannon, Roux, Rosenthal and others. The The modern methods used are:

1. Barium meals and the fluoroscope.
2. Gastroscopy.
3. Gastro-electrograms, which are simply the measurement of electrical potentials at various points on the stomach.
4. Motion picture X-rays.
5. Motion pictures taken by camera inside stomach.

As a result of these investigations, the following conclusions have been arrived at regarding *normal* gastric movements.

1. Possible existence of a pacemaker, the position of which is unknown — possibly a highly rhythmic segment in the lower curvature near the cardia.

2. A gastric cycle or actually a tonic cycle of the stomach. The tone undergoes rhythmical variations. So during systole the peristaltic waves are deep, during diastole they are reduced. A cycle lasts about 20 seconds.

3. Extreme variation in site of origin of waves and the paths they take. They may travel to pyloric sphincter, to the antrum. There may be reverse waves. There may be contractions with no progress at all.

4. There are usually two types of waves: (1) the normal deep peristaltic wave at 3 per minute, (2) small rapid ripples at 11 per minute.

Cannon has described these fine wavelets found predominantly in the fundus. They run to and fro, having little effect on the contents. So the bolus of food remains undisturbed and the saliva has a chance to act on the starches.

The innervation of the stomach is through extrinsic nerves — the vagi and the sympathetic — via the coeliac plexus. These communicate with the intrinsic nerve plexus whose normal function is the co-ordination of the inherent rhythm contractions of the smooth muscle. The action of these nerves on the stomach is opposite to that of the sphincters. Therefore the sympathetic inhibits gastric motility with closure of the sphincters. Vagus is the opposite.

In 1938 Mescham and Quigley made some interesting experiments on dogs by means of three tandem balloons placed one in the pyloric antrum, one in the pyloric sphincter, and one in the duodenal bulb. With this set up, theye found that these three regions operated as one functional unit — a peristaltic wave in the stomach passing successively over all these structures. The pyloric sphincter was found passively relaxed most of the time, contracting only when a wave passed over it.

The emptying of the stomach was found by Abbott and Hartkins to depend on two factors:

First, and by far the most important, the intragastric pressure, that is, the tone of pars pylorica.

Second, and of small importance, a peristaltic wave tending to push along the food.

The movements of the stomach may be further classified as:

1. Interdigestive or *hunger motility*, in absence of food.

2. Digestive motility, in presence of food.

Digestive motility has been described above. *Hunger motility* is characterized by:

1. Small tonus waves running over the stomach at a rate of 3 per minute.

2. Superimposed on these are deep "hunger" contractions at a rate of 2 per minute. The hunger contractions themselves show a periodicity of about 20 to 30 minutes, gradually increasing in strength to a peak and then either waning off or ending in a tetanic contraction for 2-5 minutes. It is this hunger motility and tonus that is largely responsible for appetite. Those with a low tone have usually a very poor appetite.

The "so-called" Enterogastric Reflex is the regulating mechanism of gastric emptying. The required stimuli include the presence of digested food, of acid, of hypertonic solutions and of fat or dextrose solutions in the duodenum, and distension of the duodenum. The reflex inhibits gastric emptying and it does so by an inhibition of gastric motility rather than closure of pyloric sphincter. Part of the phenomenon may be a nervous reflex but undoubtedly it is mainly due to the liberation of an inhibitory substance in the blood stream—enterogastrone.

Important factors influencing gastric emptying are:

1. *Emotional*—depressed by fear, anxiety, pain, anger.

2. Mild *exercise* increases peristaltic contractions, strenuous exercise inhibits them.

Rest depresses it.

3. *Sleep* has an insignificant effect.

4. *Insulin* increases motility and secretion by producing a vagal stimulating hypoglycemia.

5. *Central nervous system.* (1) Lesions of frontal lobes produce a ravenous appetite. (2) Lesions of mid-brain, anterior

portion, i.e. sympathetic centre, decreases emptying time. Posterior portion near vagal centre has opposite effect.

6. *Drugs.* Atropine is large doses blocks acetylcholine and therefore inhibits motility. Adrenaline and ephedrine have a similar action. Alcohol, lactic acid, sodium bicarbonate, histamine and choline all markedly increase gastric motility. Morphine also slightly increases gastric emptying. Anaesthetics of all types slow gastric emptying.

The effect of smoking was investigated by Schneedorf and Ivy, who published a paper on the effect of tobacco on hunger motility and secretion in March, 1939. They found that hunger contractions in man ceased after the first few puffs of smoke. They may not recur for 15 to 60 minutes. The promptness of the action suggests a nervous reflex rather than due to absorption of nicotine. In an experiment, three dogs were taken with sympathetic supply removed, but they still obtained a prompt inhibition on inhaling tobacco smoke. Three dogs with the vagus removed showed no inhibition at all, so the vagus is the mediator of the reflex.

The effect of smoking on the emptying time of a test meal. This was measured in a group consisting of seven normal chronic smokers and twenty-two patients with duodenal ulcer. The subjects in the morning smoked two cigarettes within 1½ hours of the test meal. Then a test meal of 250 cc. beef tea and two crackers was ingested. Following the meal, 3-4 more cigarettes were smoked in the next hour. The results shown in the slide are:

1. *Chronic smokers,* (*a*) no change in rate of emptying, (*b*) distinct lowering of acidity in half of them.

2. *Ulcer patients,* no change in acidity or emptying time.

A Short Summary of the Physiology of the Stomach

Pyloric Sphincter

A very clarifying article on the function of the pyloric sphincter was published by Dr. Wilson of this department in 1937. Being dissatisfied with the previous explanation of the function of the pylorus—that it was "the keeper of the gate", normally closed, but stimulated to open by acid gastric contents—he performed the following experiment.

Introducing a balloon into the pylorus of two dogs, he obtained tracing. These tracings were believed to give an accurate representation of the activities of the sphincter as the balloons were 5 mm. in length or the actual length of the pylorus, measured radiographically. The shape of the curve showed:

1. A rapid contraction and a slower relaxation of the sphincter.

2. The sphincter is closed for only one-third of each cycle, that is, only when a peristaltic wave is passing over it.

Wilson measured the tonus of the sphincter with a water manometer and found it to be very low, 1-5 mm. of water. The actual function of the pylorus has, then, nothing to do with evacuation but probably helps to prevent regurgitation following a wave. Impulses arising from all over the body — especially the gall-bladder, kidney or appendix—influence the sphincter.

W. H. Dickson tells the story of a ward patient who was brought to him for a barium meal. For over an hour no barium passed through the pyloric sphincter, nor could it be forced through by pressure. Finally an excited house surgeon arrived on the scene and asked if this patient had been seen as he was wanted in the operating room for the removal of his acutely inflamed appendix. This is a very graphic example of how an inflamed organ in the

abdomen will cause a spasm of the pylorus. This may account for the vomiting seen in these conditions.

So the summary of the pylorus is:

1. Nervous control, same as cardia. Sympathetic, constricts. Vagus, inhibits.
2. Sphincter normally open.
3. Sphincter contracted for one-third of cycle.
4. Has a passive role in evacuation, but prevents regurgitation.
5. Tension or tone is low.

In the *duodenum* four types of movement are observed.

The first is a contraction of the cap or first part of the duodenum. This is a general contraction which empties the cap *en masse*.

The second is peristaltic contractions of the duodenum apart from the cap, propelling the food backwards.

The third type is a mixing or segmenting movement. When there is an overloading of the duodenum due to too rapid emptying of the stomach, peristaltic waves appear, then quickly die out, to be replaced by a fourth type of movement, antiperistalsis. Of course, at the same time the enterogastric reflex is put into operation, producing an inhibition of gastric motility.

The remainder of the small intestine is also described as having four types of movement.

The first type is the *rhythmic movements*, consisting of constrictions — dividing, re-dividing, and merging of the contents. Their action is, of course, to mix the foodstuffs with the digestive juices and to aid absorption by spreading the chyme over the mucosal wall.

According to Krishman, the segmenting movements of the intestine are carried on by a contraction of the circular muscle coat with a synchronous relaxation of the longitudinal muscle, and then vice versa. This is well seen in this recording from the ileum of a cat.

Secondly, *pendular movements* are simply annular constrictions — throwing the contents of a short loop from one end to another. This action is purely local churning and, according to Krishman, it is due to a contraction of the longitudinal muscle with inhibition of the circular muscle.

Thirdly are *movements of the intestinal* villi, which are of two main types:

1. A pendular or swaying to and fro movement;
2. A quick shortening contraction of the whole villus with a slow lengthening. They move completely independently of each other. It has been concluded that with each contraction of the villus the contents of the central lacteal are pressed out.

Finally *peristalsis*. Krishman has shown that a peristaltic wave consists of a contraction of the circular muscle in a segment, an inhibition of the longitudinal muscle in that segment and simultaneously an increased tonus or contraction of the longitudinal muscle in the segment below it with an inhibition of the circular muscle.

There are two types of peristaltic waves:

The first is a slow advancement of food for a short distance, 7-8 cms., following a period of segmentation.

The second, and the principal method by which the food is advanced, is a rapid movement—a peristaltic rush—which may begin anywhere in the tract, travel at the rate of 7-25 cms./sec., even jumping over a powerful contraction of the bowel, even over a complete division of the bowel.

Alvarez has found a rhythmic gradient to exist in the muscle of the bowel. The rhythmicity is highest at the duodenum where contractions occur at the rate of 17 per minute and lowest at the ileum, with a rate of 10/min. If section A is excised and reversed, it acts like a drain trap—fluids may get through but solids dam up. He uses this theory to explain the coincident signs of vomiting

and diarrhea. An irritation provoking the diarrhea upsets the alimentary gradient, reversing it, producing a partial obstruction, and thus evoking vomiting.

The nerve control of the small intestine is, of course, by vagus and sympathetic, vagus giving an increased tone and motility, sympathetic decreasing tone and motility. Sometimes, however, the reverse effects may be observed, depending principally on the initial state of the intestine.

The factors influencing peristalsis produce various results:

1. Water increases the depth of contractions.
2. Milk and buttermilk diminish depth and rate.
3. Soda gives deep but slow contractions.
4. Severe headaches stop peristalsis.
5. With overloading of the terminal ileum, only weak peristaltic movements are obtained.
6. In diarrhea there is paradoxically a diminished rate and force.

The *ileo-colic sphincter* is a papilla about 2 cm. in diameter, projecting 1 cm. into lumen of caecum.

Peristaltic waves descending the ileum cause an enlargement of the sphincter with a jet-like expulsion of about 4 c.c. of semi-fluid chyme. Normally the sphincter is contracted tightly—differing thus from the pylorus. It also differs from the pylorus in that distension of the caecum does not cause any appreciable diminution of the rate of flow through the sphincter.

There is a gastro-ileac reflex present. Within approximately five minutes of the taking of food there is a marked increase in the flow of chyme through the ileo-colic orifice. The sphincter is controlled by the sympathetic, causing constriction, and by the vagus, causing a slight inhibition at first, then constriction. The functions of the sphincter are put down as:

1. Preventing regurgitation of bacterial-laden faeces, and
2. Preventing too rapid elimination of ileal contents and thereby preventing a constant diarrhea.

However, actually, the ileo-colic sphincter is of very little importance as patients that have had an anastomosis between the colon and ileum progress very satisfactorily and show usually no intestinal disturbances at all.

The Movements of the Large Intestine

The caecum and ascending colon normally exhibit no obvious movements at all, being described by Barclay as a picture of "still life." In animals, antiperistaltic waves may sometimes be observed, probably acting as a mixer. The remainder of the large intestine is also free from all the usual small intestinal movements. Sometimes there is a poorly defined sluggish peristaltic movement. Some hours after a meal the shadow cast by the large gut has a segmented appearance. After each meal a *gastro-colic reflex*—not to be confused with the *gastro-ileal reflex*—is set up. The haustral markings suddenly disappear and a strong rapid peristaltic wave starting at the upper right flexure of the colon travels to the pelvic colon sweeping all before it. Fecal matter is forced into the rectum and the defecation reflex is iniated. This type of movement, called mass peristalsis, is analogous to the peristaltic rush movements of the small intestine.

I regret that due to the scope of this paper and the brevity of the space allotted I have been unable to take up such important subjects as vomiting, the influences of purgatives, the dilated colon known as Hirschsprung's disease, and others. However, the highlights of gastro-intestinal motility have been dwelled upon sufficiently, and should give one a fair conception of this truly important topic!

NON-UNION OF FRACTURES

F. I. LEWIS, F.R.C.S. (Edin.)
Department of Surgery, University of Toronto

Study of the factors underlying failure of certain fractures to heal should begin with a review of some of the aspects of healing of fresh fractures.

It is well known that fractures through cancellous bone heal more rapidly and more certainly than others. This is due to: (1) the rich blood supply, (2) the large number of bone cells found in this type of bone, (3) the small amount of inert substance (calcium phosphate) present so that the soft tissue reaction is unimpeded; i.e. the wide surfaces of the fragments with a large area of healing.

Vice-versa, in bones where the blood supply is poor, where the bone is acellular, cortical in consistency with a large amount of inert substance and where the fracture surfaces tend to be small, healing will be slow and uncertain, and delayed union and non-union relatively common.

At this point it is necessary to define the terms delayed union and non-union. Delayed union may be said to have occurred when the fracture has not healed within a month more than the average time for that fracture under ordinary circumstances of fracturing and treatment. If healing of any fracture has not occurred in 2 - 2½ times the normal, then non-union is said to have occurred. Formerly non-union was defined as failure to heal in six months. This is a very arbitrary time limit and one which is too long for some fractures; i.e., Colles fracture, and too short for others, such as subcapital fracture of the femur. Under either of these definitions there will be many cases in which it is very questionable if one should wait this length of time before instituting other treatment.

With the foregoing in mind, let us consider the main special causes of non-union. These naturally fall into two main categories, (a) local, (b) general, but often one finds both present in the same case.

Local Causes in Order of Their Importance

Blood Supply:

(a) *Poor blood supply to one fragment.* This is typically seen in fracture of an almost completely intra-articular fragment; i.e., subcapital fracture of the neck of the femur or fracture through the waist of the carpal scaphoid bone. In both of these lack of absolute fixation applied for a sufficient length of time may be an added factor, but not necessarily so.

(b) *Poor or complete loss of blood supply to both fragments.* This is most frequently found in fractures with gross deformity and wide stripping of periosteum and muscles from the ends of the fragments. The most typical example, perhaps, is in compound fractures where the fragments are thrust through the skin and are completely denuded. An interesting variation of this is found in those cases in which large piece of bone has been broken free from one or other of the main fragments. The circulation to this piece of bone is invariably poor and if it includes the whole thickness of the shaft, non-union almost always occurs at one or both ends. It is not necessary to mention all the possibilities. One other relatively common group is

the fracture-dislocations at shoulder and ankle.

(c) *Inadequate reduction of the fracture.* Within limits this is not so important in children where the stimulus to heal is so great. Practically speaking, in adults it is most often a main factor in neglected cases or in fractures in special locations; i.e., both bones of the forearm or in fractures of the femur just below the great trochanter. One must include in this group those fractures, usually of long bones and most often the femur, treated by traction in which the fragments are overpulled and separated. If this situation is not quickly dealt with, non-union is very apt to occur. The other type of case which will only be mentioned here is that in which the failure to reduce the fracture properly is due to foreign material between the ends of the fragments. During attempted reduction if one cannot obtain crepitus and the fragments tend to spring back into the original deformity, this condition should be suspected.

(d) *Inadequate immobilization either qualitatively or quantitatively.* Some years ago the best example of this was found in fractures of the neck of the femur treated by a plaster spica. Nowadays fractures of the carpal scaphoid are probably most commonly inadequately treated.

(e) *Foreign material between the ends of the fragments.* Fascia or muscle is most commonly found and occurs principally in fractures of long single bones in which there has been marked deformity and in which one fragment ends in a sharp spike. At the height of the deformity the spike pierces muscle or fascia and carries it between the fragments when relaxation is attempted.

(f) *Infection.* Mild infection of a compound fracture does not seem to retard union. Non-union is almost certain with severe infection with death of bone.

(g) *General debilitating diseases such as diabetes, nephritis, etc., may be a factor in non-union. Fractures in* tertiary syphilitics often fail to heal, presumably because of focal change in bone and specific changes in the blood vessels to the area.

(h) *New growth.* Secondary Carcinoma or Sarcoma.

Treatment

The requirements in any case depend, as one would expect from the foregoing, on the causes. Some or all of the following may be required in the individual case:

1. Reduction
2. Freshening of the ends of the fragments.
3. Fixation (internal)
4. Bone grafting
5. Fixation (external)

1. *Reduction of the fracture.* If this is required, as a rule it is necessary to cut away the scar between the ends and occasionally shorten the bone to allow the ends to come together because of muscle and fascial shortening. This does away with any stability the fracture may have had and therefore internal fixation by a steel plate, wiring or some other means will be required. Often in this type of case, because of the extensive falling of the fragments with consequent damage to the blood supply, healing will be slow in spite of the bone graft which will be required.

2. *Freshening of the ends of the fragments.* This consists of excising the scar tissue between the fragments and occasionally also of removing sclerosed bone so that bone as cellular as possible and with

as good a blood supply as possible may be brought into contact. Years ago cases were often left so long that nature attempted joint formation with sclerosis of the bone ends, etc. At operation in these cases it was often impossible without shortening the fragments excessively to bring good bone into contact. This is an argument for reasonably early surgical intervention in fractures that fail to heal. In those fractures where the original reduction has been good, it is wise to leave a rim of the scar about the opposing ends to maintain stability and thus do away with the necessity of other internal fixation than the graft.

3. *Internal fixation.* The method used depends on the fracture and may be one of the following: Smith-Petersen nail; steel plate; single or multiple wire sutures, etc.

4. *Bone graft.* The purpose of the graft is to stimulate union, and the ideal bone for grafting is cancellous bone. Unfortunately, this has little strength, so most often the graft is taken from the tibia. Occasionally the shaft of the fibula is trimmed and used as a peg. Under ideal conditions the graft should be firmly held in contact with cellular and vascular bone in both fragments of the host.

5. *External fixation.* In certain cases where internal fixation with a steel plate has been necessary, external fixation may not be required but, ordinarily, external fixation with a plaster cast must be used to give sufficient fixation.

Time Required for Healing After Bone Grafting

Although in individual fractures this will vary tremendously, a good general rule is to allow one month to six weeks longer than the usual time for a fresh fracture in the same site.

OBSTETRICS AND GYNAECOLOGY OF THE CONTRACTED PELVIS

K. F. CLUTE, B.A., M.D. (4T5)

Pelvic contraction is defined by Schumann[1] as the shortening of any of the essential diameters of the pelvis to such an extent "as to effect materially the normal mechanism of labour, whether or not the ultimate delivery of the child is impeded."

Various classifications of pelvic contractions have been suggested, based upon aetiology, morphology, and clinical measurements.. From the point of view of aetiology, the pelvic abnormalities may be grouped as congenital, as traumatic, or as being due to disease processes. This classification is both unsatisfactory, since in some cases the cause is unknown, and of little practical value, since the management of the case is not determined by the cause. Thus, for example, rickets may cause so slight a flattening of the pelvis that vaginal delivery can occur, or may result in such gross deformity that Caesarian section is necessary. In both cases, the cause is the same, but the methods of handling the cases differ widely.

Caldwell and Moloy[2] have made an intensive study of the morphology of female pelvis and, on the basis of their observations, divide them into five groups, viz. (1) the gynecoid pelvis which is the most desirable type, (2) the android pelvis, (3) the anthropoid pelvis, (4) the platypelloid pelvis, and (5) the asymmetrical pelvis, whose general contour, apart from the asymmetry, usually resembles that of one of the first four groups. Each of these five groups is sub-divided into those with a narrow outlet, those with a moderate outlet, those with a wide outlet, and large and small pelves.

The gynecoid pelvis is the one whose inlet is nearly round. The iliopectineal lines pass backward from the symphysis in a broad, graceful curve to the widest transverse diameter, and the portion of the iliopectineal line which lies behind the greatest transverse diameter is long, so that the greatest transverse diameter lies well forward. The importance of this is that when the foetal head assumes a transverse position, its antero-posterior diameter lies midway between the sacral and the symphysis—unless asynclitism occurs— and, if the greatest transverse diameter lie posterior to this level, it is of little value. The posterior portion of the iliopectineal line is long because the sacrosciatic notch is large. Indeed, on vaginal examination, one can insert three fingers readily between the ischial spine and the sacrum. This type of pelvis usually has a wide subpubic angle, and the free edges of the inferior pubic rami are rolled outwards. Both of these features assist in producing an ample pelvic outlet. When the gynecoid type of pelvis is contracted, it is contracted generally i.e. it is the justo-minor pelvis. This will be discussed later.

In the *android pelvis,* the anterior portions of the iliopectineal lines are straight, rather than curved, and the angle between them at the symphysis is small, so that the anterior segment of the pelvic inlet is narrowed. Since these pelves have narrow sacrosciatic notches, the posterior portions of the iliopectineal lines are short. The significance of this is that the widest transverse diameter of the pelvis lies closer to the sacral than it does in the gynecoid type; and the antero-posterior diameter of the foctal head cannot occupy the widest transverse diameter of the

pelvic inlet since the pushes the head forward, so that its antero-posterior diameter must try to pass through the narrow anterior segment of the inlet. If the head engage in the transverse diameter of the brim, the occiput must rotate posteriorly if the available space is to be used to the greatest advantage. As the head descends, the resistance increases, especially as the sacrum is usually straighter than in the gynecoid type. There is great likelihood of arrest occurring in the mid-pelvis. Since forceps are difficult to apply and it is likely to be too late to do either version or Caesarian section, it is preferable, if these cases are recognized before labour begins, to do an elective Caesarean section.

In the *anthropoid pelvis,* the antero-posterior diameter of the brim shows an absolute increase, while the transverse diameter is decreased either relatively or absolutely. The anterior portions of the iliopectineal lines are straight and contain a small angle, so that there is an impairment of the available space in the anterior segment. The posterior segment, however, compensates for this in the following manner. Since the sacrosciatic notch is larger even than in the gynecoid pelvis and since, in consequence, the posterior portion of the iliopectineal line is long, the greatest transverse diameter of the inlet is well forward from the sacrum.

In these cases, the foetal head can engage only in the antero-posterior diameter of the brim. If it engages in the posterior position, difficulty will be experienced in rotation as the head descends, and Caldwell and Moloy feel that, if these cases be recognized, they should be delivered by forceps as persistent posteriors.

The *platypelloid pelvis* is the opposite of the anthropoid pelvis i.e. the antero-posterior diameter is long. In these cases, the head must engage in the transverse diameter, and, as the biparietal diameter is often greater than the antero-posterior diameter of the pelvic inlet, the bitemparal diameter passes through in the antero-posterior diameter of the brim, while the biparietal diameter passes through lateral to the mid-line, where there is more space available. Asynclitism usually comes into operation in these cases. Since the transverse diameter is the greatest right down through the pelvis, rotation should not be attempted until the head is low enough that the rotated occiput will lie *beneath* the symphysis. Where rotation has been performed earlier, serious intracranial injuries have resulted from crushing of the head between the symphysis and the sacrum.

In *asymmetrical pelves,* the posterior portion of the iliopectineal line usually is shorter on one side than on the other and the anterior portion of this line on the affected side is straighter than that on the other side.

The classification of Caldwell and Moloy, while interesting, has the serious drawback of not including those cases which are the result of pathological processes.

The most satisfactory classification of contracted pelvis would appear to be the following:

1. Justo-minor i.e. the generally equally contracted pelvis.
2. Flat pelvis i.e. decrease in anterior-posterior diameter.
   (a) simple
   (b) rachitic
3. Combination of (1) and (2).
4. Transversely contracted pelvis.
   (a) congenital
   (b) kyphotic
   (c) Robert pelvis—which is really a special case of congenital transverse contraction.
5. Obliquely contracted pelvis
   (a) due to hip joint disease

(b) due to scoliosis
(c) Naigele pelvis

6. Grossly deformed pelvis
   (a) due to osteomalacia
   (b) due to rickets
   (c) due to trauma
   (d) due to caries and necrosis
7. Rare forms of pelvic contraction
   (a) spandylolisthesis
   (b) high assimilation
   (c) funnel pelvis
   (d) split pelvis
   (e) ankylosis of pelvic joints
   (f) encroachment upon the pelvic cavity of neoplasms of pelvis bones.

Justo-Minor Pelvis is a gynecoid pelvis, all of whose dimensions are smaller than normal. If the head engages at all, spontaneous delivery will occur. If the head does *not* engage, then Caesarian section is indicated. Since obstruction does not occur in these cases *after* engagement has taken place, one is not likely to get into serious trouble in the management of such cases.

Simple Flat Pelvis is the platypelloid pelvis of Caldwell and Moloy. Its cause is unknown. Its existence should be suspected when the rhomboid of Michaelis is flattened superiorly. The mechanism of labour has already been dealt with. When a combination of the simple flat pelvis and the justo-minor pelvis occurs. the mechanism of labour is the same as for the simple flat pelvis alone. In a simple flat pelvis, the outlet is contracted as well as the inlet, and, as I have mentioned earlier, rotation should not be effected until the occiput has passed the pelvic outlet.

Rachitic Flat Pelvis is easier to manage than simple flat pelvis, in that, once the head has passed through the pelvic brim, no further trouble is likely to be encountered. The lower portion of the sacrum is rotated backwards, so that the antero-posterior diameter of the pelvic outlet is increased. When the rachitic flat pelvis is combined with the justo-minor pelvis, the antero-posterior diameter of the inlet is usually so short as to necessitate Caesarian section.

Congenital Transversely Contracted Pelvis would seem to be the same as the anthropoid pelvis (g.v.), since the average transverse diameter of the gynecoid and the android pelves are 13.76 and 13.56 cms. respectively, while that of the anthropoid pelvis is 12.94 cms[3]—a substantial difference.

Kyphotic Transversely Contracted Pelvis. Kyphosis of the thoracic portion of the vertebral column has no effect upon the pelvis. When kyphosis of the lumbar region occurs, there is a shift of weight posteriorly. This causes the upper portion of the sacrum to rotate posteriorly and its lower portion to rotate anteriorly and upwards. The posterior portions of the ilia are forced further apart by this rotation and the ischial tuberosities approach each other. Thus there is a narrowing of both the antero-posterior and the transverse diameters of the pelvic outlet. An effort should be made to determine beforehand the degree of contraction of the outlet, and, if it appears unlikely that delivery can be effected from below, Caesarian section should be performed.

Robert Pelvis. Although this is a congenital transverse contraction, it is listed by itself since it is a special case, in that both alae of the sacrum are absent. In this case, Caesarean section is indicated.

Obliquely Contracted Pelvis may follow scoliosis or hip joint disease. The method of management is determined by the degree of deformity.

Naegele Pelvis is a special type of obliquely contracted pelvis, caused by the absence of one sacral ala. This has generally been regarded as a very rare

condition, but the report of Thoms,[4] that he had seen four cases in five years in a clinic handling a relatively small number of cases, seems to indicate that it is commoner than was formerly believed. The previously supposed rarity of this condition may be explained by the fact that these cases are not easily recognized. One of Thoms' cases has had eight pelvic examinations by six different men and another case had had five pelvic examinations without the abnormality being noted. The latter case had four vaginal deliveries, the first with forceps, the remaining three spontaneously. The first two babies weighed over seven pounds, the third over eight pounds, and at the fourth delivery there were twins. Another patient was delivered with forceps of a seven-and-a-half pound and a nine-and-a-half pound baby.

As these cases may give no external evidence of the condition, either by gait or by posture, the diagnosis rests upon vaginal examination unless an X-ray happens to be taken. On vaginal examination, the lateral wall of the pelvis is found to be closer to the mid-line on the affected side than on the other side.

While Caesarean section would seem to be the treatment of choice with such a gross abnormality, Thoms' report demonstrates that the finding of a Naegele pelvis does not, in itself, call for Caesarean section without further consideration.

Gross Deformity of the Pelvis may be caused by severe rickets or by osteomalacia, but these cases are exceedingly rare in this continent. The sacrum is usually pushed far forward towards the symphysis; and the angle between the iliopectineal lines is so acute that the anterior portion of the pelvis has the shape of a beak. Management of these cases depends upon the degree of distortion, but in the severe cases Caesarean section will be necessary.

Caries and necrosis of the pelvis during childhood may result in deformity. Fractures of the pelvis, also are a cause of deformity. Each of these cases must be considered individually, as the degree of contraction varies from case to case.

Spondylolisthesis is a rare cause of pelvic contraction. In this case, the lumbar spine has slipped forward on the sacrum. Usually the antero-posterior diameter of the pelvic inlet is so markedly reduced as to render vaginal delivery impossible. The physical findings which suggest this diagnosis are lumbar lordosis, shortening of the trunk, close approximation of the ribs to the iliac crests, pendulous abdomen, and, on vaginal examination, projection of the fifth lumbar vertebra infront of the sacral promontary.

High Assimilation, i.e. fusion of the fifth lumbar vertebra with the sacrum, may make rotation difficult, when the occiput is in the posterior position, and result in the baby being born face to pubis.

Funnel Pelvis is not a distinct type. Rather, this term is employed in referring to any pelvis which slopes down to a narrow outlet. This condition is diagnosed from the size of the subpubic angle, the distance between the ischial tuberosities, the length of the ligaments, and the distance from the symphysis to the lower end of the sacrum.

Split Pelvis is very rare, and the individual does not usually survive to the child-bearing age.

Ankylosis of the sacro-iliac and sacro-coccygeal joints and of the symphsis may be a factor in difficult labour in the elderly primipara since the slight spreading that usually occurs at these joints cannot take place.

Neoplasms of the Pelvic Bones may

obstruct labour if they project into the pelvic cavity.

Diagnosis of Pelvic Contraction is based upon

1. History (a) of previous labours
   (b) of trauma or disease affecting the pelvis.
2. General physical examination
3. Pelvimetry (a) external
   (b) internal
   (c) radiological
4. Test of labour.

The *history* of previous labours should include such points as whether the babies were born at or before term, whether the deliveries were spontaneous or required the use of forceps or of Caesarian section, the duration of the labours, and the weights of the babies at birth. A multipara, whose previous labours were without difficulty, may usually be presumed to have a normal pelvis, provided that the babies were not below normal weight, although the cases that I have already cited of babies of normal weight being delivered spontaneously through Naegele pelves are proof that absence of difficulty in labour does not, by itself, mean in all cases that the pelvis is normal. Moreover, as the babies' weights tend to increase with multiparity, one labour may be free from difficulty, while, in the next, disproportion may be a problem. Enquiry should be made, also, regarding the occurrence of rickets or of pelvic fracture.

On *general physical examination* any deformity of the spine and any abnormality of gait should be observed. The rhomboid of Michaelis should be noted, as flattening of this, either from above downward or from side to side, is usually associated with a contraction of the pelvis. Furthermore, the general build of the woman may suggest the type of pelvis with which one is dealing. A small woman is likely to have a gynecoid pelvis, while the woman with broad shoulders and narrow hips may be expected to have the android type of pelvis. The tall, thin woman may have the athropoid pelvis.

The *external pelvic measurements* that are usually made are the interspinous, the intercristal, and the external conjugate diameters. On *vaginal examination*, the diagonal conjugate diameter is measured, an effort is made to gauge the size of the subpubic angle; and the height of the symphysis, the curvature of the sacrum, the length of the sacrospinous ligaments, and the prominence of the ischial spines should be noted. The examiner should observe whether the ischial tuberosities are widely enough separated for the fist to be inserted between them.

Although, in teaching, much emphasis has been laid upon these measurements, their value is being questioned. Thoms[5] says, "For the most part, (methods pertaining to the superior strait) are not only inadequate but often misleading." The interspinous and intercristal diameters may bear the normal relationship to each other, and yet the pelvis may be rachitic none the less. The value of measuring the external conjugate diameter is lessened when one realizes that (1) it is difficult to measure accurately, since posteriorly there is no definite bony landmark, and (2) it is difficult to assess the significance of moderate degrees of shortening of this diameter. Even the diagonal conjugate may be thought to be longer than it really is, because the height or the thickness of the symphysis is increased.

Because of the inadequacies of these methods of pelvimetry, Thoms advocates *radiological examination* of the pelvis. By using his grid method, accurate measurements of the pelvic inlet can be made. Lateral plates are of value in ascertaining the curvature of the sacrum and

in following the descent of the head in tests of labour. He does not suggest the *routine* use of lateral plates, but reserves them mainly for cases in which the pelvis is thought to be rachitic and for some cases in which engagement of the head fails to occur.

Test of labour is the ultimate method of determining the degree of contraction of a pelvis. This will be considered under treatment.

Treatment

The possible methods of handling cases of contracted pelvis are:

1. Premature induction of labour.
2. Test of labour.
3. Caesarian section.
4. Internal podalic version.
5. Pubiotomy.
6. Symphysiotomy.
7. Craniotomy.

The last three I shall dismiss first. Pubiotomy and symphysiotomy are too mutilating to find favour in this country. Craniotomy has its place when the baby is dead; but in cases in which the child is still living, it can be countenanced only if all other methods are certain to result in the death of the mother.

Whether labour should be induced prematurely or a test of labour should be made at term is a matter of controversy. Medical induction before term is usually unsuccessful. Surgical induction by rupture of the membranes has the disadvantage that, if delivery *per vaginam* prove impossible and Caesarean section be necessary, the risk of infection has been greatly increased; and in borderline cases it is impossible always to distinguish beforehand the cases in which vaginal delivery will be possible and those that will require Caesarean section.

Wiseman[6] reports a method of premature induction, which, he claims, does not prejudice the patient's chance of surviving a Caesarean section later. When he finds by weekly bimanual examination that the foetal head will just mould through the pelvic brim, he inserts the index finger up into the cervix and strips the membranes from the uterine wall as far up as he can reach. The same day, medical induction is commenced. In a series of thirty-two cases, whose true conjugate diameters lay between 3¼ and 3¾ inches, labour began within ten days in all except three cases, and forceps were needed at the pelvic outlet in only two cases. There was one death. The advantages that he claims for this method of treatment are that Caesarean section is safe, if it be needed later, that the intact membranes are a protection to the head as it moulds through the pelvic brim, and that prolapse of the cord is obviated.

Other disadvantages of premature induction, besides the risk of infection, are that the premature baby does not stand labour as well and has less chance of surviving after it *is* born than the full-term baby, and that before term the cervix is not softened as it is at term.

Barnett[7] advances the following arguments in favour of premature induction of labour:

(1) By this method, one avoids the long, difficult labour that may result from test of labour at term and that may produce a dead child. He maintains that some wives and husbands are so discouraged by this tragic outcome of the first attempt that they will not try again.

(2) Premature induction reduces the incidence of Caesarean section. In a series of 111 cases, in whom labour was induced prematurely, the foetal mortality was 11.7% and no Caesarean sections were performed. In a series of 57 cases, on the other hand, that were subjected to test of labour, the foetal mortality was 15.8%, two of the fatalities

being in cases in which delivery was by Caesarean section. In all patients of both series, the antero-posterior diameter of the pelvic brim was between 3¼ and 4 inches. This investigator feels that, if radiological methods of pelvimetry were used more extensively, the cases requiring premature induction could be picked with greater certainty and their number reduced accordingly. He would employ test of labour only in those cases either in which there is pelvic contraction but no disproportion or in which disproportion is suspected but contraction cannot be demonstrated.

In spite, however, of the British enthusiasm for premature induction of labour, the preference here seems to be for test of labour in those cases in which there is a reasonable possibility of vaginal delivery. In determining how a particular case should be handled, the antero-posterior diameter of the inlet is taken as a guide. When this diameter is between 10.5 and and 9 cms.; the foetal head usually can be pushed into the pelvis easily and delivery occurs spontaneously or is effected by forceps. When the inlet has an antero-posterior diameter between 9 and 7.5 cms.; there is said to be *relative contraction*. The head is difficult to push into the pelvic brim but does not overlap it. Test of labour is indicated. Forceps are usually needed when delivery is accomplished from below, and in some cases recourse must be had to Caesarean section.

When the antero-posterior diameter of the inlet is less than 7.5 cms.. there is *absolute contraction*. The head overlaps the pelvic brim, and Caesarean section must be performed, unless the child is dead, in which case craniotomy is indicated. When the measurement is less than 5.5 cms.; delivery were by craniotomy is impossible, and Caesarean section must be done whether the child is alive or dead.

The next problem is how a test of labour should be conducted and how long it may be allowed to continue before it becomes no longer safe to perform a Caesarean section. The main point in its conduct are to prevent the patient from becoming exhausted, dehydrated, or acidotic. To these ends, she should be given plenty of nourishment and fluid—intravenously if necessary—and enough sedative to ensure adequate sleep. It is considered safe to perform a Caesarean section up to thirty-six hours after the onset of labour or up to twenty-four hours after the rupture of the membranes, *provided* that the patient is not exhausted, that her pulse rate and temperature are not elevated, and that there is no evidence of infection of the liquor amnii.

I have now dealt with all the methods of managing cases of pelvic contractions, except internal podalic version. The advantage of this procedure is that the after-coming head behaves somewhat like a wedge. Since its bimastoid diameter is smaller than the biparietal by about 2 cms. the former may readily pass through the pelvic brim where the latter does not. When the uterine contractions may force the broader biparietal diameter through with moulding of the skull. The disadvantage is that this procedure commits the obstetrician to delivery from below, whereas it is impossible in most cases, to be certain that even the after-coming head will be able to pass through the pelvic inlet. Accordingly, this method should be used with great caution.

Summary

I have endeavoured in this paper, to deal with the various methods of classification of contractions of the pelvis, to outline briefly the several methods of diag-

nosis, to point out that roentgenograms are the only really accurate method of pelvimetry, and to discuss the relative merits of the various possible methods of handling these cases.

REFERENCES

[1]E. A. Schumann. *Text Book of Obstetrics*, chapter XXX.

[2]W. E. Caldwell and H.. C. Moloy. *American Journal Obstetrics and Gynaecology, 26*: 479. 1933.

[3]J. C. B. Grant. *Method of Anatomy*, p. 342 (after T. W. Todd).

[4]H. Thoms. *J.A.M.A., 124*: 294. 1944.

[5]H. Thoms. *Surg., Gyn., and Obs., 52*: 963. 1931.

[6]D. C. Wiseman. *Brit. Med. J.* Feb. 12, 1944.

[7]V. H. Barnett. *J. Obs. and Gyn. of the Br. Empire, 49*: 524. 1942.

Feature

L. A. F. MOES, Editor

THE PERIPATETIC MEDICAL SOCIETY

In 1904 the Faculty of Medicine introduced an innovation. An examination was held at the end of the third year. In the four year course clinical teaching began in the third year and it had been recognized that the student would be in a state of confusion so he was not asked to submit to examination. The state of confusion in the first clinical year seems to have persisted but the examinations have recurred relentlessly notwithstanding. The Faculty know what the student should assimilate in the present fourth year but the student finds that he is not offered a balanced diet. One day it is all vitamins, the next a can of beans and the day following plum pudding and nothing else. The enzymes of his mentality attack the varying meals but indigestion follows many of them. Torpor follows and a movie or choir practice or other relaxative is indicated.

The trouble is in the transition from pupil to student. The former requires a teacher to supervise every item of study and check every result. The latter only needs an instructor to direct effort and provide the missing item when the problem cannot be solved without it. There is a third stage that comes later. The scholar has acquired method from experience as a student and directs his own effort and finds his own solutions.

The orderly presentations of laboratory subjects with criteria by which the student is able to estimate his progress is succeeded by the clinic in which orderly presentations are usually impossible. The student has had a lecture on ulceration and comes to the clinic hoping to see an example of every possible type of ulcer. It so happens that there are no cases available for demonstration but there is a synovitis of the knee joint. That throws the pupil all out of balance but the student goes home, turns up the section on synovitis in his text book, reads the article and makes a note on the margin that will recall the case when he comes to review later on. The ulcers will present themselves on another day and will be similarly read and noted.

One effective way of easing the indigestion following clinical demonstrations on a presentation by one clinician that has been offered on the same subject by another on a previous occasion is to form informal peripatetic debating societies.

These societies consist of the members of a clinic and peripatesis is the daily journey from hospital to lecture room. These journeys are necessarily hurried but they are never without conversation. In the unorganized group the talk may range from sermons to infrapatellar morphology but in the organized society it is a discussion of the clinic from which the members are making all haste. The idea of "mutual instruction" used to work in military training when the drill sergeant had more squads than he could handle. It works in clinics.

Fifteen minutes to get away from a downtown hospital and arrive at the

lecture hall affects people in different ways. The pupils have had one lesson and are hurrying to another. The students have reacted and go into session. The subject the clinic; the queer ideas of the clinician and the challenge to apply what one knows about anatomy, physiology or pathology to the case in point are the agendae. Repeat this at every opportunity and clinics will always claim interest even though it be only to find something to oppose. Discussion will often crystallize in a question that will put the instructor on his mettle. A keen class always gets the best from a clinician. A keen clinician never disappoints his class.

MALCOLM H. V. CAMERON

Abstracts

M. ST. AUBIN, Editor

Contributors

Miss L. Aszkanazy D. A. Gibson
R. W. Lamont-Havers

MEDICINE I

Louse-borne Typhus Fever

Stevens R. S. *Lancet* 1 : 106, Jan. 1945

The author presents a series of 21 cases of typhus fever which occurred in a military hospital in the Middle East. Seven soldiers received hyperimmune serum (Lederle), while 14 fell ill before the serum arrived and were untreated. Thus the effect of the serum can be evaluated by comparison with the control group.

Course in untreated group: When the eruption was at the zenith, the colour deepened and petechiae appeared either on the macules or unrelated to them. Then a gradual fading took place. Five patients, i.e. a third, died. The others had fever for two weeks with severe headache, tremors, mental confusion and increasing prostration merging into coma. Recovery was protracted.

Course in treated group: The first patient had been ill for six days, when the serum arrived. He received 80 cc, in two doses intravenously on the 6th and 7th day, but died two days later. The other 6 patients were given immediately 40 cc. intravenously and the same dose intramuscularly. The next day they received 40 cc. intramuscularly and then 20 cc. daily as long as necessary. All these cases recovered. The eruption was similar to the ones in the untreated group and convalescence was equally protracted. The fever also lasted two weeks, but was lower, and headaches, mental confusion, coma, etc., were absent or much reduced.

These results indicate, that hyperimmune serum is of value in reducing the mortality of the disease and the severity of the attack.

L. A.

PEDIATRICS I

Pathogenesis and Clinical Symptoms of Tuberculous Meningitis

Stefan Engel M.D. *British Journal of Children's Diseases.* April, June, 1944.

PATHOGENESIS.

Tuberculous meningitis in young children usually breaks out several months after a macro-glandular caseation.

The author carefully studied 13 cases of tuberculous meningitis in children, one of whom died early in the course of the meningitis, from pulmonary lesions. His study lead him to think that the route of infection is not usually direct to the meninges by the blood, nor to the cortex with rupture of a tubercle into the subarachnoid space. He found that the villi of the choroid plexuses were always converted into tags and debris of tuberculous granulation tissue, containing tubercle bacilli. These tuberculous masses, he concluded, rupture, infecting the spinal fluid. The meninges about the base of the brain (the characteristic site of the gross lesion) are infected from the spinal fluid coming from the plexuses. He does not regard

this as the only way for infection to occur, but suggests it as a common and probably the usual way.

SOME CLINICAL FEATURES.

Classical clinical features, he found, occurred in only a minority of 76 cases. Blockage of the basal flow of the spinal fluid results in congestion of the ventricles and increased intra-cerebral pressure, bearing greatly on the clinical picture.

In the prodromal stage the symptoms of meningeal irritation, such as headache, malaise, and drowsiness are less marked in young children, in whom vomiting often predominates.

In the next stage of increased intra-cerebral pressure the symptoms are less marked in the very young children of pre-school age, among whom tuberculous meningitis is most common.

In the absence of these symptoms he recommends the use of a certain early sign of increased intra-cranial pressure, which is due to irritation of the vegetative nervous system, namely dermographia. This is not specific, but is present early in increased intra-cranial pressure, which is suggestive of tuberculous meningitis.

D. A. G.

PEDIATRICS II

Two Cases of Morvan's Syndrome of Uncertain Cause

PARKS H. AND STAPLES O. S. *Arch. Int. Med.* 75 (2) : 75 Feb. 1945

This syndrome was described first by Augustin Morvan in 1893. It develops in young children of either sex and consists of loss of sensation of pain, temperature, usually also touch in all four extremities. Soon trophic changes appear such as ulcers, atrophy of bones and changes in nails, often combined with infection so that amputation becomes necessary. Tendon reflexes are normal or diminished to a varying degrees, paralysis and muscular weakness or atrophy are absent. The course of the disease is benign.

The condition is not Leprosy, since no organizisms can be found. It differs from Syringomyelia by being symmetrical, showing impairment of all forms of sensation, but no signs of involvement of the anterior or posterior horns or of the lateral columns, and by running a more chronic course.

The authors describe two of their own cases, a boy and a girl, and review 7 cases occurring in children from the literature.

The suggestion is made, that the cause may be an inflammatory or degenerative lesion or a congenital imperfection in the trophic centre of the medulla, i.e. the nucleus of the lateral cornua and the superior sypathetic nucleus of Jacobson.

L. A.

PEDIATRICS III

Penicillin: Its Use in Paediatrics

HERRELL W. E. AND KENNEDY R. L. J. *J. Paed. 25* (6) : 505. Dec. 1944

This is a report of the treatment of 54 children with various infections in the Mayo Clinic.

Dosage: In bacterial infections, the recommended dose for infants is 20-40 thousand units of the Na or Ca salt per day; for larger children, 40-80 thousand units. For local application on soft tissues or bone, the appropriate dose is 250-500 Oxford units per cc. of saline. When the powdered form is used, it may be mixed with sulphanilamide in the proportion of 5000 units of the Ca salt of penicillin per gram of sulphanilamide.

Routes: (1) *Systemic:* Infants receive

intramuscularly 1-5 thousand units in 1-2 cc. every 3 hours. Larger children, especially when sepsis is present, receive continuous intravenous drip. In this case, the dose is dissolved in 500-1000 cc. of saline and the flow is so adjusted that the whole amount is delivered in 24 hours.

(2) *Intrathoracic* (for empyema, etc.): Every 24 hours, 20-30 thousand units in 20-30 cc. of saline are injected directly into the pleural cavity after thoracentesis.

(3) *Intra-articular:* Every 48 hours for about a week, 5000 units in 5 cc. of saline are given after aspiration.

(4) *Intrathecal* (for meningitis, etc.): After spinal drainage, 10 thousand units in 5-10 cc. of saline are administered daily as long as necessary.

(5) *Bonemarrow* (if muscular areas or veins are not available): The total dose in 1 litre of saline is given in 24 hours. The sternum, clavicle, tibia or femur may be used.

(6) The oral and intracolonic routes cannot be used for penicillin.

Results: A great variety of infections was treated. In none of the cases were serious toxic reactions or significant alterations in the blood elements. Cellulitis without bacteraemia, otitis media, septic arthritis and eye infections, and various skin infections, like pyoderma, impetigo, and furunculosis were cleared up completely or showed substantial improvement. Of two cases with meningitis, one recovered, the other died after improvement. Pulmonary suppurative conditions were cleared up completely, but necessitated drainage and resection in one case. Of 9 patients with bacteraemia (Staph. aureus, N. intracellularis, E. coli and Aer. aerogenes) 8 responded to penicillin. Two children with subacute bact. endocarditis improved after receiving very large doses and their blood became sterile. It is recommended to select early cases with penicillin sensitive strains. Acute and subacute osteomyelitis was cured, when surgical drainage and bone removal was added to the treatment. Chronic osteomyelitis improved only temporarily. In actinomycosis the soft tissues healed, but it was suspected that slight osteomyelitis remained.

L. A.

PEDIATRICS IV

Traumatic Rupture of the Spleen

Marcel, M. S. *J. Paed. 26* (1): 8. Jan. 1945.

Rupture of the spleen occurs in 30 per cent of all cases of trauma to the abdomen and should always be suspected. A constant symptom is increasing and persisting abdominal pain in the left upper quadrant. Present also may be shock and signs of internal hemorrhage, muscular rigidity, dullness in the flanks, nausea and vomiting. The blood count is not necessarily lowered immediately, since the blow may compress the spleen and force the blood out into the vessels.

The author believes that the spleen is ruptured mostly by direct blow, i.e. the ribs are compressed suddenly over the the spleen, which breaks at the weakest spot, the hilum, or splits at the surface.

Four cases are described in children who suffered direct trauma to the abdomen. Broken ribs or visible injury to the abdomen were absent, nor did the blood counts show any significant reduction in the number of red cells or haemoglobin.

The treatment indicated is blood transfusion followed by operation. The author stresses the importance of operating at once if rupture is suspected. If only a light tear is present the spleen may be sutured, but if the organ is injured severely splenectomy is necessary.

L. A.

PEDIATRICS V

Healed Asymptomatic Miliary Tuberculosis

KASSOWITZ, K. E. *J. Paed.* *26* (1) : 56. Jan. 1945.

A short review is given of the literature on cases with recovered miliary tuberculosis of whom some showed, and others were free from, clinical symptoms. The author then reports the case of a boy who was observed for 13 years and who did not at any time present any clinical symptoms.

The boy's family gave no history of tuberculosis. At one year of age the boy suffered of peritonsillar abscess, bronchopneumonia, thrush, and rickets, and had a negative tuberc. reaction. At 7 years, he had uncomplicated measles; at 8 years, acute tonsillitis and left otitis media, with positive Kernig's and Brudzinski's signs. One month after treatment he had a positive tuberculin reaction and the X-ray showed a Ghon's lesion. Four routine examinations during the following year resulted in normal findings. He was perfectly well during this time and remained so during the following years. A routine X-ray made when he was 10 years revealed calcified nodular tuberculosis in both lungs. (The pictures are included in the report.) This X-ray picture has remained unchanged until the date of the publishing of the article, when the boy was 13 years. L. A.

SURGERY

Androgen Control Therapy in 130 Cases of Carcinoma of the Prostate

HEGES, C. C., M.D., AND SAUER, H. R., M.D. *Surgery, Gynecology and Obstetrics.* Feb. 1945, Vol. 80, No. 2.

From a follow-up study of their cases, the authors conclude that although favour-

You pray *he* will inherit

a Peaceful world

You are making sacrifices now so that your boy may enjoy manhood in a world freed from war . . . but ahead of him lie peacetime battles: for education, for position in the world, for self-respect!

The start in life you give him will be his weapon.

By taking out a Mutual Life of Canada insurance policy for him *now*, you start him on a worthwhile savings program . . . with the advantage of a low premium rate because of his age, as well as the usual benefits of *low-cost* Mutual Life insurance.

Have a Mutual Life representative explain the special features of this Company . . . and let him help you arrange a policy for your son.

Make this Your Company by Becoming a Policyholder

THE MUTUAL LIFE OF CANADA

Established 1869

Head Office: Waterloo, Ontario

able response to this form of treatment was accomplished in numerous instances, as time progressed the number of delayed failures increased, leading to skepticism as to the ultimate outcome of all cases.

The results obtained were most favourable in the group of patients with metastatic lymph node involvement. In contrast, they found the spread or local extension of bone metastasis was not arrested as a rule by androgen control treatment. Also, this method of treatment does not protect the patient with non-metastatic cancer of the prostate from developing metastasis at a future time.

However, in spite of apparent ineffectiveness of androgen control therapy on bone metastasis proper, many patients derive temporary benefit such as disappearance or improvement of pain, gain in weight, and increase in well-being. Also improvement of obstructive symptoms and regression of the local lesion may take place until resurgent symptoms, usually indicating the terminal stage of the disease, make it evident that the tumour has not lost its activity.

It is doubtful whether this form of treatment influences the course of inoperable nonmetastatic prostatic carcinoma, although it may alleviate symptoms for a while.

The authors believe that androgen control therapy, especially gastration, should be employed only in cases where (1) the patients have metastatic disease, (2) the presence of metastasis are suspected, or (3) rapid enlargement of the primary lesion becomes apparent.

Castration is stated to be the more effective procedure if quick relief from pain is the object of therapy. A comparison of end results in the group of castrated patients with the end results in a group of castrated patients who received additional estrogen showed no appreciable difference.

Exclusive stilbesteral medication is indicated where (1) patients with operable carcinoma of the prostate refuse surgery, (2) patients refuse orchidectomy, (3) patients have moderately advanced lesions of apparently low grade malignancy with little or no symptoms.

Failures which occur following exclusive stilbesteral administration may be improved at least temporarily by orchidectomy, while estrogen administered in case of failure following castration is ineffectual as a rule.

Working on the belief that immediate or delayed failure of androgen control therapy, was the stimulation of extragonadal foci of androgen production by the pituitary, external radiation was given to this organ in 23 patients. The impression gained was that some degree of palliation was accomplished, and that the rapid downhill course in delayed failure patients was slowed down at least temporarily in some of the cases treated.

Thus androgen control therapy should be valued as a palliative procedure only until new or additional methods of therapy are found by which occurrence of delayed failures can be postponed or even avoided.

R. L-H.

"20 arsenical"

Never let a patient lapse from treatment for early syphilis till he has had a minimum of 20 intravenous injections of arsenical. More than "20 arsenical" is advisable as a rule, less than "20 arsenical" never!

Arsenical controls communicability.

Syphilis and Pregnancy

Because:

(1) During pregnancy active lesions of syphilis are rarely seen; and,
(2) A history of a previously known primary lesion is rarely obtained;

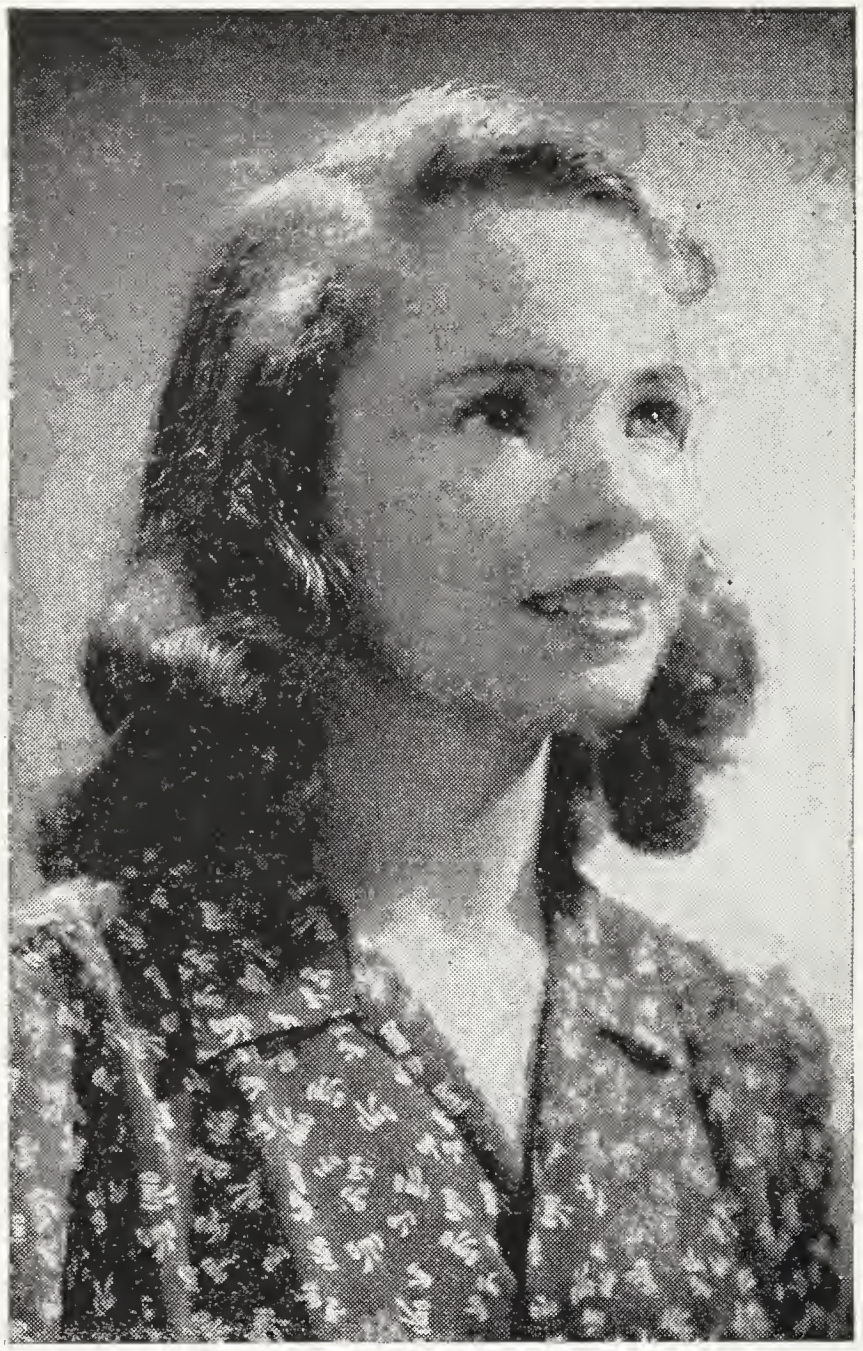
Therefore:

Diagnosis can be made **only** by repeated blood tests.
"Blood Tests for Every Expectant Mother Before the Fifth Month".

Pelouze . . . " . . . in line with the march of progress."

The time is here when we must hasten to erase past faults, and get ourselves in line with the march of progress. None of us is too good to treat gonorrhea and none is justified in treating it by the old haphazard ways still so commonly held. The same society that looked down upon gonorrhea as a just reward for what it called "sin" is being rapidly awakened to the enormity of this problem, and the time is here when every physician should know more about the disease itself and what it means to society than about its purely therapeutic aspects.

"Find V.D. Contacts---Report V.D. Cases"



Physically
A WOMAN!

Psychically
A CHILD!

Conflicts in the mind of the teen-aged child are numerous and complex. Great understanding by parents is very necessary . . . Often, you will have to advise them, as well as prescribe for the patient.

In many instances the doctor has found a simple, direct answer by "considering the blood" . . . With the diagnosis of hypochromic anemia, and its treatment, an important step has been taken in building up the physical side of the teen-ager, followed generally by favorable mental adjustments.

For the hypochromic anemia of the teen-ager consider

HEMATINIC
PLASTULES

JOHN WYETH & BROTHER (CANADA) LIMITED
WALKERVILLE, ONTARIO

BALANCED

VITAMIN SUPPLEMENTATION

The daily requirement
of the
most essential vitamins
all in one tablet

"Supplavite"

Vitamin A, vitamin C, vitamin D, vitamin B_1, riboflavin and nicotinamide.

The daily requirement
of essential vitamins
with minerals
in divided dose form

"Alphamin"

Vitamins A, C, D, B_1, riboflavin and nicotinamide with iron and calcium.

AYERST, McKENNA & HARRISON LIMITED • ***Biological and Pharmaceutical Chemists*** • **MONTREAL, CANADA**

Sulmefrin is available in 1-oz. dropper packages and 1-pint bottles. Pink-tinted solution.

SULMEFRIN* *gives relief from discomforts of winter colds*

Shortens their course in some instances
Relieves pressure pain in blocked sinuses

SULMEFRIN decreases congestion by the vasoconstrictor action of *dl*-desoxyephedrine hydrochloride, thus assisting the antibacterial action of sodium sulfathiazole. The vasoconstrictor is also believed to facilitate the sulfonamide in reaching the deeper layers of the nasal mucous membrane.

The mild alkalinity of Sulmefrin (pH approx. 9.0) is preferable according to Turnbull et al[1] for nasal medication because (1) the sulfonamide has the greatest bacterial action in the pH range from 8 to 10, and (2) because it allows ciliary action to continue for a long period of time.

Sulmefrin may be administered by spray, drops, or tamponage.

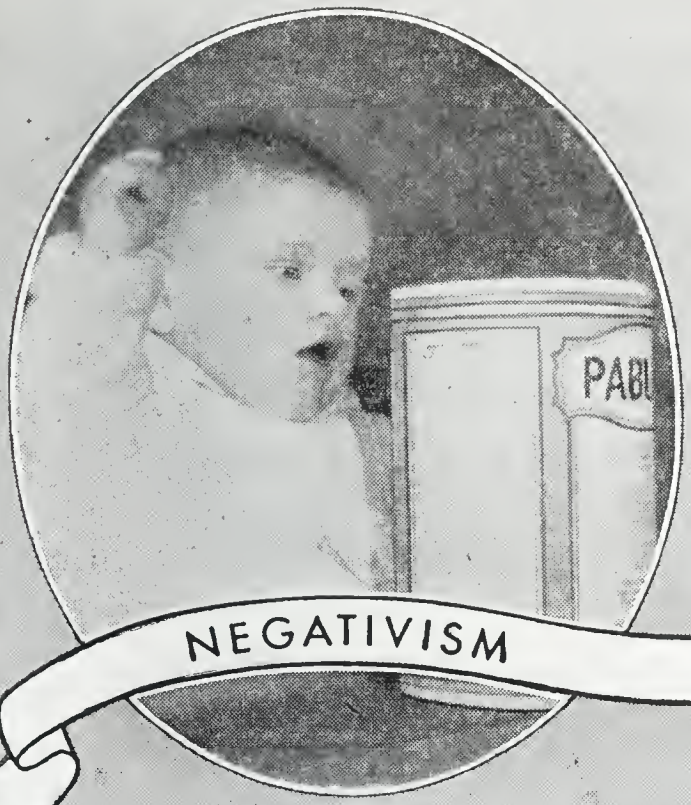
Also Available
SULMEFRIN OPHTHALMIC

A special formula for treatment of ophthalmic infections caused by sulfathiazole-sensitive organisms.
Supplied in 1-oz. dropper bottles. Yellow-tinted solution.

For literature write
36 Caledonia Road, Toronto

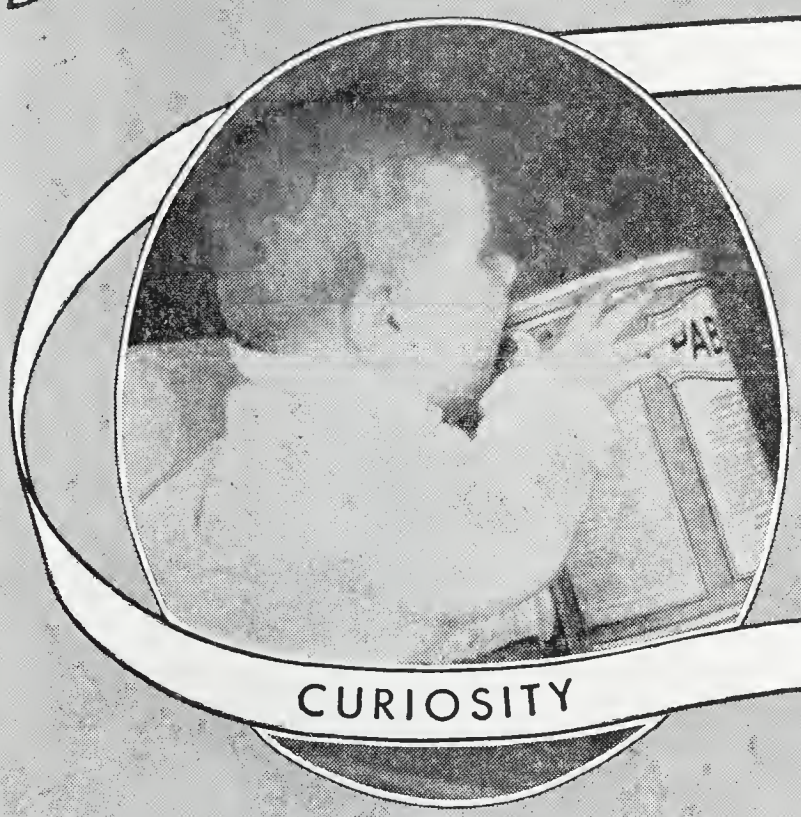
E·R·SQUIBB & SONS OF CANADA, Ltd.

Manufacturing Chemists to the Medical Profession
Since 1858



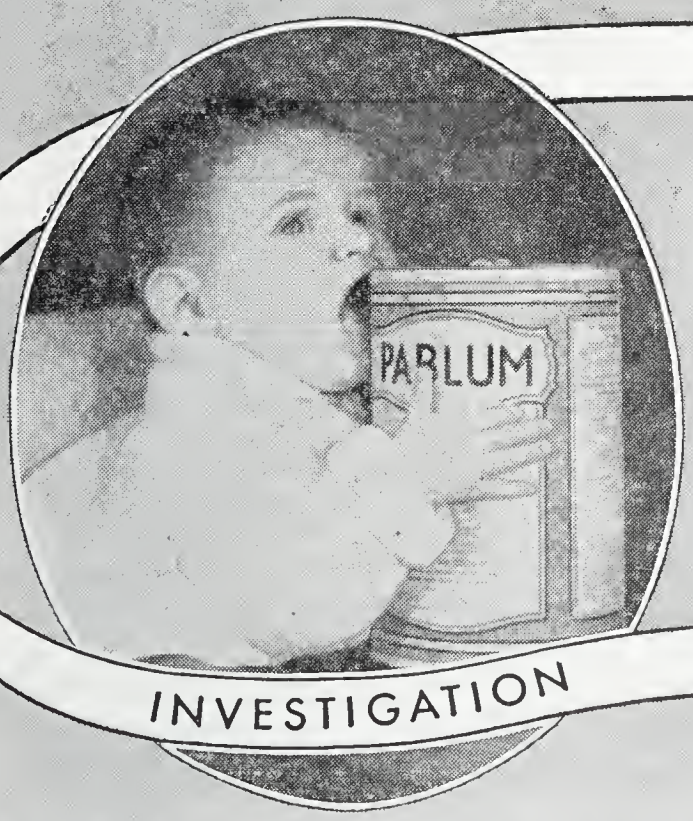
NEGATIVISM

CONTEMPLATION



CURIOSITY

INTEREST



INVESTIGATION

ACCEPTANCE

A Young Lady's First Impressions

COPYRIGHT, 1944, MEAD JOHNSON & CO.

At the Menopause

"SORROW"
A study by Aristide Maillol; reproduced from the Hyperion Press art book "Maillol".

All patients, however severe or mild their symptoms, can be treated effectively with these orally-active natural oestrogens. "Premarin" (No. 866) for the most severe symptoms; the *new Half-Strength* "Premarin" (No. 867) when symptoms are moderately severe; "Emmenin" for mild symptoms and maintenance.

"PREMARIN" and "EMMENIN"

conjugated oestrogens (equine)
Tablets No. 866; Tablets No. 867

conjugated oestrogens (placental)
Tablets No. 701; Liquid No. 927

NATURALLY OCCURRING • WATER SOLUBLE • WELL TOLERATED
ESSENTIALLY SAFE • IMPART A FEELING OF WELL-BEING

Now Available! "PREMARIN" *Half-Strength*

(No. 867)

A new potency for those patients whose symptoms, though severe, do not require the intensive therapy provided by "Premarin" full strength.
Bottles of 20 and 100 tablets.

AYERST, McKENNA & HARRISON LIMITED
MONTREAL *Biological and Pharmaceutical Chemists* CANADA

Ayerst

302